Year 8 Topic 1 – Computer Systems

Lesson	Can you?
1 Get in gear	Recall that a general-purpose computing system is a device for executing programs Recall that a program is a sequence of instructions that specify operations that are to be performed on data Explain the difference between a general-purpose computing system and a purpose-built device
2 Under the hood	Describe the function of hardware components Describe how the hardware components work together Recall that all computing systems have an 'architecture'
3 Orchestra conductor	Analyse how the hardware components used in computing systems work together in order to execute programs Define what an operating system is, and recall its role in controlling program execution
4 It's only logical	Describe the NOT, AND, and OR logical operators Use logic gates to construct logic circuits Describe how hardware is built out of logic circuits Recall data is represented using binary digits
5 Thinking machines	Define 'artificial intelligence' and 'machine learning' Identify examples of artificial intelligence and machine learning in the real world Describe the steps involved in training machines Describe how machine learning works Associate the use of AI with moral dilemmas
6 Sharing	Explain the implications of sharing program code

Useful websites

- www.scratch.mit.edu
- www.computerhistory.org
- www.thecrashcourse.com/courses/computerscience
- www.youtube.com/watch?v=5ocq6_3-nEw
- www.khanacademy.org/computing/computer-science#how-computers--work
- www.en.wikipedia.org
- www.youtu.be/DFBbSTvtpy4
- www.youtu.be/CO67EQ0ZWgA
- www.youtu.be/n-zeeRLBgd0
- www.teachablemachine.withgoogle.com
- www.experiments.withgoogle.com/collection/ai
- www.quickdraw.withgoogle.com
- www.machinelearningforkids.co.uk
- www.projects.raspberrypi.org
- www.code.org/oceans
- www.royalsociety.org

KNOWLEDGE ORGANISER
Key Stage 3 - COMPUTING

The invention of the computer has had a huge impact on our day-to-day lives, and they are now present everywhere – at home, at work and in education.

It is easy to recognise that personal computers, laptops and mobile devices are computers, but computers are also hidden in many more devices. Computers are found in many of the devices we use on a daily basis. Because they are relied on so heavily, knowing what they are and how to use them is valuable.

Many electronic circuits have to make decisions. They look at one or more **inputs** and use these to determine the **outputs** from the circuit. The process of doing this uses electronic logic, which is based on digital switches called **gates**. Each input and output of the **logic gates** must be one of two states:

- **True** or **1** or **on**
- **False** or **0** or **off**

AND gate

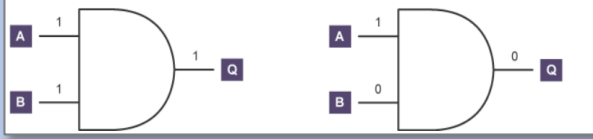
An **AND** gate usually has two inputs. **AND tells us that both Input A AND Input B have to be 1 (or ON) in order for the output to be 1. Otherwise the output is 0.**

The Boolean expression can be written as **Q = A AND B**.

The truth table would look like this:

Input A	Input B	Input Q
0	0	0
0	1	0
1	0	0
1	1	1

Logic gate diagrams would look like this:



OR gate

An **OR** gate has two inputs. **OR tells us that EITHER Input A OR Input B has to be 1 (or ON) in order for the output to be 1. Otherwise the output is 0.**

The Boolean expression can be written as **Q = A OR B**.

The truth table would look like this:

Input A	Input B	Input Q
0	0	0
0	1	1
1	0	1
1	1	1

Logic gate diagrams would look like this:

NOT gate

A NOT gate has just one input. NOT tells us that Input A has to be 0 (or OFF) in order for the output to be 1. Otherwise the output is 0. A NOT gate is sometimes called an inverter.

The Boolean expression is written as Q = NOT A.

The truth table would look like this:

Input A	Input Q
1	0
0	1

Logic gate diagrams would look like this:

What does AI do?

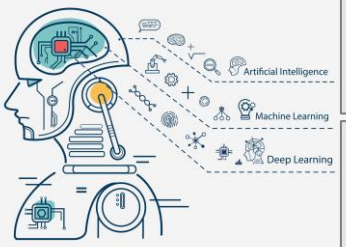
AI can be used for many different tasks and activities.

Personal electronic devices or accounts (like our phones or social media) use AI to learn more about us and the things that we like. One example of this is entertainment services like Netflix which use the technology to understand what we like to watch and recommend other shows based on what they learn.

It can make video games more challenging by studying how a player behaves, while home assistants like Alexa and Siri also rely on it.

In the 1960s, scientists were teaching computers how to mimic - or copy - human decision-making.

This developed into research around 'machine learning', in which robots were taught to learn for themselves and remember their mistakes, instead of simply copying. Algorithms play a big part in machine learning as they help computers and robots to know what to do.



Why are people worried about AI?

Many people have concerns about AI technology and teaching robots too much.

Famous scientist **Sir Stephen Hawking** spoke out about it in the past. He said that although the AI we've made so far has been very useful and helpful, he worried that if we teach robots too much, they could become smarter than humans and potentially cause problems.

Another concern about AI is that if robots and computers become very intelligent, they could learn to do **jobs which people would usually have to do**, which could leave some people unemployed.

Other people disagree, saying that the technology will *never* be as advanced as human thoughts and actions, so there is not a danger of robots 'taking over' in the way that some critics have described.

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